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EXAMINING THE EFFECT OF DIRECTED ACTIVITY RELATED TO TEXTS (DARTs) AND GENDER ON STUDENT ACHIEVEMENT IN QUALITATIVE ANALYSIS IN CHEMISTRY

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ABSTRACT

Purpose – The present study examined the effect of Directed Activity Related to Texts (DARTs) and gender on student achievement in qualitative analysis in chemistry. It focused on the qualitative analysis component of the Chemistry course, which for students has been perceived as being the most difficult aspect of their mastery of the subject.

Methodology – The study involved 120 secondary four science stream students from two local fully residential schools. In a quasi-experiment, participants studied the topic of qualitative analysis of salt, using one of the following three instructional methods: Experiment, DARTs, and Combination of Experiment and DARTs. The participants in the three groups were then tested on their knowledge about salt.

Findings – Results of a two-way independent ANOVA performed on the experiment data revealed a significant main effect corresponding to the type of

instructional method that the three groups were treated to — the mean scores for the Combined method group was the highest, followed by the DARTs group, and then the Experiment group. Further analysis using an independent t-test showed that the difference in mean scores between the DARTs and Experiment groups was significant. It is argued that participants' learning in the Combined method group might have been enhanced by the DARTs instructional method. The effect of gender and the interaction effect between the variables were not significant.

Significance – The findings of the study has provided clear experimental evidence regarding the role of the DARTs instructional method in enhancing qualitative analysis learning in chemistry. These findings also provided important insights to educators on DARTs as an alternative method of teaching and learning the topic on qualitative analysis in chemistry.

Keywords: Directed activity related to texts, qualitative analysis, chemistry, student learning, salt, gender.

INTRODUCTION

Chemistry is an important subject to be mastered by science stream students. Nevertheless, chemistry is regarded as a difficult subject to learn among students (Chu & Hong, 2010; Osman & Sukor, 2013; Woldeamanuel et al., 2014). As a result, students tend to have a negative attitude towards chemistry (Yunus & Ali, 2013), such as not being interested in it, and having no motivation to learn the subject (Broman et al., 2011). Qualitative analysis is one of the components of Analytical Chemistry which has been perceived by students as being difficult to understand (Lay & Osman, 2015). The learning of topics about qualitative analysis in chemistry involves both process skills and the understanding of many other concepts within the broader field of chemistry (Hikmah et al., 2018). Qualitative analysis is a method used to identify the components of a substance, such as the presence of ions in an unknown compound using a chemical test. For example, students are able to identify the presence of the zinc ion in an unknown salt solution when the salt solution forms a white precipitate that is soluble in excess sodium hydroxide solution or excess ammonia solution.

The common approach to learn qualitative analysis in schools includes both learning the theoretical knowledge in the classroom (non-experimental method) and conducting a practical session in the laboratory (experimental method). Qualitative analysis in chemistry is commonly assessed in the